

Cutting-Edge Programs,
Smart People, Cool Research

FIND IT ALL AT ILLINOIS TECH

BE IT ALL APPLIED MATHEMATICS.

Illinois Tech is a small, private university that educates students to go on to do big things. For graduates of our **Department of Applied Mathematics (AMAT)**, this has included further study at top graduate schools and jobs at places like Goldman Sachs, Blue Cross Blue Shield, Wolfram (developers of Mathematica), and more.

Applied mathematics at Illinois Tech is challenging. And when you finish the program, you'll discover that many different options await you. There is a growing demand for people whose undergraduate training emphasizes modern applied mathematics. These positions are typically interdisciplinary and focus on a combination of modeling, analysis, statistics, and computation. You'll find applied mathematicians in such diverse fields as actuarial science, education, financial services, pharmaceuticals research, and municipal administration. And they are working everywhere—in commerce, industry, and government—where quantitative methods are used to make decisions.

AMAT Specializations at Illinois Tech

Receive your bachelor's degree while specializing in an area of interest to you.

- Mathematical Finance
- Applied Analysis
- Math Education
- Computational Mathematics
- Discrete Applied Mathematics
- Stochastics

Where Minors Are Major

AMAT students take a minor outside of the department—giving you an area of focus where mathematics may be applied. Minors in **computer science, business, psychology, entrepreneurship, artificial intelligence**, or one of the **engineering** areas, for example, allow you to pursue your application area of interest. Our AMAT program is designed for maximum flexibility, allowing you ample opportunity to assemble a portfolio of courses that will satisfy your intellectual curiosity and prepare you for your career.

Students who pursue specializations or minors in mathematical finance or business may qualify for admission to our highly rated **Master of Mathematical Finance** program.

Research—Even As an Undergrad!

Applied mathematics undergraduates at Illinois Tech have the opportunity to work on major research right from the start. We also offer \$5,000 Undergraduate Summer Research scholarships to select students.

Recently, two AMAT undergraduates worked on research projects with assistant professor **Sonja Petrović**, resulting in a research paper accepted by the *SIAM Undergraduate Research Online* journal. And last summer Tianci Zhu (Applied Math 3rd year) worked with Fred Hickernell, chair and professor of AMAT, to develop financial applications that utilize the Guaranteed Automatic Integration Library.



Research on the Edge

With Ph.D.s from MIT, UCLA, Cornell, UC San Diego, Illinois Tech, and Vanderbilt University, to name a few, our applied mathematics faculty are pushing the boundaries of what we know in many areas, including computational mathematics, discrete applied mathematics, statistics, and stochastics. Our research groups include:

- Algebraic Statistics
- Discrete Mathematics
- Mathematical Finance
- Meshfree and Monte Carlo Methods
- Multiscale and Stochastic Modeling and Computation

Professor **Jeffrey Duan** is researching the interaction of coupled oscillating systems. Oscillatory movements or rhythms are essential for various systems. When a rhythm stalls, the effect can be fatal. In a power grid it can mean a blackout, and in the human heart even death. Duan's research team has developed a new approach for revoking these undesired effects. They use dynamical systems tools, combined with analysis and simulation, and demonstrate the new approach in experiments with chemical reactions.



2'fer Advantage

Illinois Tech's special degree programs allow you to receive **both your bachelor's and master's degrees** in as few as five years.

- Bachelor of Science in Applied Mathematics/
M.S. in Data Science
- Bachelor of Science in Applied Mathematics/
M.S. in Computer Science
- Bachelor of Science in Applied Mathematics/
M.S. in Applied Mathematics

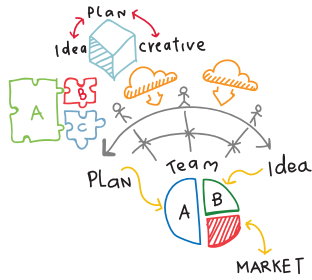


Experience It: Applied Math at Illinois Tech

“The classes at Illinois Tech are exciting and fun. I love looking at data, calculating statistics, and figuring out how to improve systems. I'm also a peer mentor and teaching assistant. It's a fun way to express what I know while also learning about a new topic.”

— **Sarah Maciorowski** (Applied Math 2nd Year/
Stochastics Specialization), St. Louis, Missouri
Camras Scholar, Women's Varsity Lacrosse and Soccer





Learn to Innovate in IPROs

In Illinois Tech's signature **Interprofessional Projects (IPRO) Program**, you'll work with students from various majors to solve real-world problems. Recent math-oriented IPROs include:

- Designing ball-and-stick models that communicate information about atoms to a computer
- Galilean test of the Einstein principle of equivalence
- Creating a reliable sports players' statistical performance evaluation methodology
- Leveraging big data and analytics for innovative access control business opportunities

STAND OUT.

Our graduates are far from ordinary.
But we expect them to be extraordinary.
Meet some of our alumni.



Jacob Matijevic
(Math '69)—One of the original technology developers for the Mars rovers



Young Ju Jo
(Electrical Engineering/ Applied Math '09)—Assistant Director—Advisory Services at Moody's Analytics, New York



Sam Karlin
(Math '44, M.S. '45)—National Medal of Science recipient, contributed to software used to first map DNA sequences



Anita Thomas
(Applied Math '13)—Recently joined Woolpert as a geospatial specialist

$$\hat{\mu}_n = \frac{1}{n} \sum_{i=1}^n Y_i$$

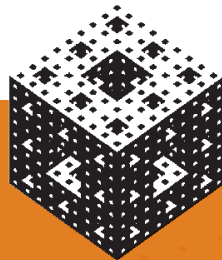
$$RMSE(\hat{\mu}_n) = \sqrt{E[(\mu - \hat{\mu}_n)^2]}$$

$$= \sqrt{\text{bias}^2(\hat{\mu}_n) + \text{var}(\hat{\mu}_n)}$$

= 0 if Y_i IID

How do we choose n to make
 $\Pr[|\mu - \hat{\mu}_n| \leq \max(\epsilon_a, \epsilon_r \mu)] \geq 99\%$
 We know that $\text{var}(\hat{\mu}_n) = \frac{\text{var}(Y)}{n}$, but
 that is not enough.
 We assume that kurtosis has a known
 bound $E[(Y - \mu)^4] \leq k_{\max} \sigma^4$
 $\sigma^2 = \text{var}(Y)$

Legacy of Excellence



Karl Menger, a former Illinois Tech mathematics professor (1946–1971), is regarded as one of the finest mathematicians of the twentieth century. He made significant contributions to the fields of dimension theory, probability, geometry, and more. Perhaps most notable among his accomplishments is his creation of the three-dimensional "Menger sponge." It's a purely theoretical shape that has infinite surface area and no volume whatsoever. And because of that, it doesn't occupy three dimensions, or two. It manages to exist in fractional dimensions.

EXPERIENCE IT

SEE WHAT HAWK LIFE IS ALL ABOUT!

Throughout the year we host a number of opportunities for you and your family to come check out everything you'd ever want to know about us!

Schedule a campus visit today at visit.iit.edu.

Or send us an email at admissions@iit.edu.

